

THE
PROCEEDINGS¹⁵⁶
OF
THE PHYSICAL SOCIETY

FROM JANUARY 1933 TO NOVEMBER 1933

VOLUME 45

Published by
THE PHYSICAL SOCIETY
1 Lowther Gardens, Exhibition Road
London, S.W. 7

Printed at
THE UNIVERSITY PRESS, CAMBRIDGE

PRINTED IN GREAT BRITAIN

OFFICERS AND COUNCIL, 1933-1934

President:

PROF. A. O. RANKINE, O.B.E., D.Sc., F.INST.P.

Vice-Presidents:

Who have filled the Office of President.

SIR OLIVER J. LODGE, D.Sc., LL.D., F.INST.P., F.R.S.	PROF. SIR W. H. BRAGG, K.B.E., M.A., F.INST.P., F.R.S.
SIR RICHARD GLAZEBROOK, K.C.B., D.Sc., F.INST.P., F.R.S.	ALEXANDER RUSSELL, M.A., D.Sc., F.INST.P., F.R.S.
SIR ARTHUR SCHUSTER, Ph.D., Sc.D., F.INST.P., F.R.S.	SIR FRANK E. SMITH, C.B., D.Sc., F.INST.P., SEC.R.S.
SIR J. J. THOMSON, O.M., Sc.D., F.INST.P., F.R.S.	PROF. O. W. RICHARDSON, M.A., D.Sc., F.R.S.
PROF. C. VERNON BOYS, F.INST.P., F.R.S.	W. H. ECCLES, D.Sc., F.INST.P., F.R.S.
PROF. C. H. LEES, D.Sc., F.INST.P., F.R.S.	PROF. SIR A. S. EDDINGTON, M.A., D.Sc., F.R.S.

Vice-Presidents:

A. B. WOOD, D.Sc., F.INST.P.	PROF. W. WILSON, Ph.D., D.Sc., F.R.S.
T. SMITH, M.A., F.INST.P., F.R.S.	J. GUILD, A.R.C.S., D.I.C., F.INST.P.

Hon. Secretaries:

ALLAN FERGUSON, M.A., D.Sc., F.INST.P. (*Papers*)
EZER GRIFFITHS, D.Sc., F.INST.P., F.R.S. (*Business*)

Hon. Foreign Secretary:

PROF. O. W. RICHARDSON, M.A., D.Sc., F.R.S.

Hon. Treasurer:

R. S. WHIPPLE, M.INST.E.E., F.INST.P.

Hon. Librarian:

J. H. BRINKWORTH, D.Sc., A.R.C.S.

Ordinary Members of Council:


LEWIS SIMONS, D.Sc., F.INST.P.	MISS M. O. SALTMARSH, Ph.D., F.INST.P.
J. H. AWBERY, B.Sc., F.INST.P.	L. F. BATES, B.Sc., Ph.D., F.INST.P.
PROF. J. A. CROWTHER, M.A., Sc.D., F.INST.P.	L. HARTSHORN, D.Sc., A.R.C.S., D.I.C., A.INST.P.
W. JEVONS, D.Sc., D.I.C., F.INST.P.	PROF. G. F. J. TEMPLE, Ph.D., D.Sc.
PROF. E. V. APPLETON, M.A., D.Sc., F.R.S.	PROF. A. F. C. POLLARD, F.INST.P.
D. OWEN, B.A., D.Sc., F.INST.P.	E. F. FINCHAM, F.INST.P.

Assistant Secretary:

H. R. LANG, Ph.D., A.R.C.S., F.INST.P., The Institute of Physics

Editor of the Proceedings:

CAPT. C. W. HUME, M.C., B.Sc.



Digitized by the Internet Archive
in 2024

CONTENTS

	PAGE
F. TWYMAN. A new apparatus for rapid spectrophotometry of liquids in the ultra-violet region	I
J. D. STEPHENSON. An experimental study of electrical discharge in gases at normal temperatures and pressures	20
G. A. TOMLINSON. A new type of free-pendulum clock	41
S. E. WILLIAMS. A photographic method of deriving the optical constants of the metals	49
M. FAHMY. A further point of analogy between the equations of the quantum theory and Maxwell's equations	67
T. C. RICHARDS. On the elastic constants of rocks, with a seismic application	70
L. R. WILBERFORCE. A common misapprehension of the theory of induced magnetism	82
T. CARLTON SUTTON. The measurement of surface tension	88
B. LLOYD-EVANS and S. S. WATTS. An investigation into the flow of air in pipes	91
MARY D. WALLER. Vibrations produced in bodies by contact with solid carbon dioxide	101
L. G. GRIMMETT. A sensitivity-control for the Lindemann electrometer	117
L. R. WILBERFORCE. Kinematic supports and clamps	120
Reviews of books	126
LEWIS F. RICHARDSON. Time-marking a cathode-ray oscillogram	135
E. G. RICHARDSON and E. TYLER. The flow of liquid suspensions	142
H. L. WRIGHT. The influence of atmospheric suspensoids upon the earth's electric field as indicated by observations at Kew Observatory	152
P. VIGOUREUX and S. WATTS. The temperature coefficient of the saturated Weston cell	172
L. F. BATES. A new apparatus for the measurement of the earth's magnetic field	180
ALLAN FERGUSON and J. T. MILLER. A method for the determination of the specific heats of liquids, and a determination of the specific heats of aniline and benzene over the approximate range 20° C. to 50° C.	194
E. V. APPLETON and GEOFFREY BUILDER. The ionosphere as a doubly refracting medium	208
J. F. HERD. The generation and reception of wireless signals of short duration	221
R. NAISMITH. A comparison of the frequency-change and group-retardation methods of measuring ionized-layer equivalent heights	235
MARY TAYLOR. The Appleton-Hartree formula and dispersion curves for the propagation of electromagnetic waves through an ionized medium in the presence of an external magnetic field. Part I: Curves for zero absorption	245
LEWIS SIMONS and E. H. SMART. A model to illustrate the motion of a diatomic rotator with two degrees of freedom	266
Sir A. S. EDDINGTON. Notes on the method of least squares	271

	PAGE
G. I. FINCH and R. W. SUTTON. The control of ignition-coil discharge characteristics	288
F. J. W. WHIPPLE. The wet-and-dry-bulb hygrometer: the relation to theory of the experimental researches of Awbery and Griffiths	307
MARY BELL and S. E. GREEN. On radiometer action and the pressure of radiation	320
Reviews of books	358
F. J. W. WHIPPLE. Relations between the combination coefficients of atmospheric ions	367
G. P. THOMSON, NORMAN STUART and C. A. MURISON. The crystalline state of thin spluttered films of platinum	381
E. V. APPLETON and R. NAISMITH. Weekly measurements of upper-atmospheric ionization	389
J. A. RATCLIFFE and E. L. C. WHITE. An automatic recording method for wireless investigations of the ionosphere	399
M. C. MARSH. The transmission of heat through fabrics	414
L. F. BATES and B. J. LLOYD-EVANS. A compact electromagnet for general purposes	425
J. V. HUGHES. The spurious ring exhibited by fluorescent screens	434
N. THOMPSON. The direct recording of relative intensities by means of a micro-photometer	441
H. A. NANCARROW. A method for the determination of the thermal conductivities of rocks	447
H. A. NANCARROW. Tables to facilitate the calculation of the temperature-distribution in a cylinder	462
E. E. WRIGHT. A note on the Kerr cell	469
A. CHRISTOPHER G. BEACH. An experiment bearing on Talbot's bands	474
Demonstration	482
Reviews of books	485
A. H. BLATCHFORD. The diffraction of X-rays by liquid sulphur	493
E. GWYNNE JONES. The hyperfine structure of perturbed series	501
A. J. BRADLEY and A. H. JAY. Quartz as a standard for accurate lattice-spacing measurements	507
L. H. MARTIN and K. C. LANG. The thermal conductivity of water	523
VAUGHAN H. STOTT. The measurement of the viscosity of a molten metal by means of an oscillating disc	530
H. R. NETTLETON and E. G. BALLS. Two simple methods of absolute measurement of electrical resistance in terms of inductance and frequency	545
D. BROWN. The demonstration of eddy currents in conductors of various shapes	555
S. TOLANSKY. The absence of fine structure in the arc spectrum of silver	559
N. R. CAMPBELL. The measurement of visual sensations	565
W. G. MARLEY. A method of measuring the specific heats of poor conductors	591
W. Y. CHANG and WILLIAM BAND. Thermomagnetic hysteresis in steel	602
W. F. FLOYD. A note on interference tones in superheterodyne receivers	610
Reviews of books	617

Contents

vii

PAGE

E. GWYNNE JONES. Hyperfine structure in the spark spectrum of cadmium	625
A. ELLIOTT. The intensities of bands in the spectrum of boron monoxide	627
A. H. JAY. A high-temperature X-ray camera for precision measurements	635
F. TWYMAN and G. F. LOTHIAN. Conditions for securing accuracy in spectro- photometry	643
W. M. HAMPTON. The visibility of objects in a searchlight beam	663
E. V. APPLETON. On two methods of ionospheric investigation	673
M. SIEGBAHN. Studies in the extreme ultraviolet and the very soft X-ray region	689
W. EWART WILLIAMS. Studies in interferometry—II. The construction, testing and use of reflection echelons for the visible and ultra-violet regions	699
C. F. B. KEMP. Observations on the intensity of low-frequency sounds close to a metal airscrew	727
J. F. HEARD. Pressure effects in the spectra Xe I and Xe II	734
Demonstration	741
Presentation of the Duddell Medal, 1933	742
Reviews of books	745
H. C. HEPBURN. Electro-endosmosis and electrolytic water-transport—III. Solu- tions of copper salts	755
W. L. BECK. A new capacity-meter	765
E. L. KINSEY and O. L. SPONSLER. The molecular structure of ice and liquid water	768
F. C. CONNELLY. The band spectrum of tin oxide	780
E. LANCASTER JONES. The rapid adjustment of observations in a network of geophysical stations by the method of least squares	792
P. C. VINCENT. A study of a sensitive manometer due to Professor Albert Griffiths	808
P. C. VINCENT. An application of a new method, due to Professor Albert Griffiths, of determining a small change in the density of a liquid	833
ERIK GENBERG. Some complementary colour relations	836
Obituary Notices:	
EDWIN EDSER	841
SIR RICHARD THRELFALL	844
Review of book	848
Index	849

